IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellants:	Yin S. Tang		
Title:	Lensed Tip Optical Fiber and Method of Making the Same		
Application No.:	10/799,483	Filing Date:	March 12, 2004
Examiner:	Jerry M. Blevins	Group Art Unit:	2883
Docket No.:	M-15347US	Confirmation No.:	8401

Irvine, California
April 25, 2008

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

APPEAL BRIEF UNDER 37 CFR § 41.37

Dear Sir:

Appellant submits this Appeal Brief in support of the Notice of Appeal filed in this case on January 9, 2008. As set forth in the Notice of Panel Decision from Pre-Appeal Brief Review, dated March 31, 2008, the deadline for filing this Appeal Brief is April 30, 2008 (or one month from the mailing date). The accompanying transmittal letter authorizes the Commissioner for Patents to deduct from the undersigned Attorney's deposit account the required fees for filing this Appeal Brief.

I. REAL PARTY IN INTEREST

The real party in interest is Yin Tang.

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II. RELATED APPEALS AND INTERFERENCES

There are no appeals or interferences known to Appellant or Appellant's legal representative which will directly affect or be directly affected by or have a bearing on the decision by the Board of Patent Appeals in the pending appeal.

III. STATUS OF CLAIMS

Claims 1 and 3-22 are pending, rejected, and appealed.

IV. STATUS OF AMENDMENTS

The Examiner issued an Office Action on October 9, 2007, in which claims 1, 6, 7, 10, and 11 were rejected under 35 U.S.C. §103(a) as being unpatentable over Thompson (U.S. Pat. No. 5,037,174) in view of Okubo (U.S. Pat. No. 5,565,978), claims 3-5, 13-17, and 20 were rejected under 35 U.S.C. §103(a) as being unpatentable over Thompson in view of Okubo and Yamane (U.S. Pat. No. 5,459,803), claims 8 and 9 were rejected under 35 U.S.C. §103(a) as being unpatentable over Thompson in view of Okubo and Cesaroni (U.S. Publ. No. 2003/0029040), claim 12 was rejected under 35 U.S.C. §103(a) as being unpatentable over Thompson in view of Okubo and Grasso, III (U.S. Pat. No. 6,375,651), claims 18 and 19 were rejected under 35 U.S.C. §103(a) as being unpatentable over Thompson in view of Okubo, Yamane, and Cesaroni, and claims 21 and 22 were rejected under 35 U.S.C. §103(a) as being unpatentable over Thompson in view of Okubo, Yamane, and Wei (U.S. Publ. No. 2004/0134884). Appellant filed a Notice of Appeal and Pre-Appeal Brief Request for Review

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on January 9, 2008. Subsequently, the Notice of Panel Decision was issued on March 31, 2008, in which the panel rejected claims 1 and 3-22.

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V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention recited in the pending claims relates to an economical and effective method for manufacturing a lens on an optical fiber. An end of an optical fiber is first etched or modified, such as by dipping an end into an etching solution, to form a continuously tapered end. Figs. 2, 3, and 4A show etching and the resulting tip, which is also described at paragraphs [0024]-[0036]. The end is then heated to form a desired shape and focal length, as described at paragraphs [0008], [0012], and [0037]-[0043] and shown at Figs. 4B and 4C.

As set forth in the summary section, the method of forming the lensed tip optical fiber of the present invention provides for controllable radius or focal length of the lens at the tip at an economical price. The lensed tip optical fiber provides for easier optical alignment with other optical fibers or various discrete and integrated photonic devices, such as light sources, planar waveguides and photonic integrated circuits. Because each optical fiber includes a "built-in" lens, individual lenses can be removed from most optical fiber packages. The removal of individual lenses reduces the number of components required and removes the possibility of misalignment between multiple lenses or lens groups, which are problems associated with typical optical packages. The reduction of the number of components creates a simpler optical package, reduces expensive packaging related labor costs typically associated with optical component packaging and manufacturing processes, and allows the optical package to be made smaller in size. Smaller size means more convenient implementation in compact system designs as well as lower cost..

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VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether the Examiner's rejections of claims 1 and 3-20 as being obvious under 35 U.S.C. §103(a) using Okubo (U.S. Pat. No. 5,565,978) to teach the limitation of "applying energy to the modified end of the optical fiber member to form a lens surface with a desired focal length" is proper.

VII. ARGUMENT

The Okubo et al. (U.S. 5,565,978) reference does not teach or suggest "applying energy to the modified end of the optical fiber member to form a lens surface with a desired focal length".

In the Office Action, the Examiner states, in part, that:

> Namely, column 8, lines 13-25 and column 10, lines 23-30, which directly present the application of energy to form a lens surface, mention that an alternative method would be to use a self-focusing lens placed at the end of the optical fiber. This would imply that the formation of a lens at a modified end of the optical fiber would also serve the role of focusing light.

Okubo teaches a refractive index sensor using total internal reflection of light beams. (See, e.g., col. 2, lines 33-36; Figs. 2(a), 3, 5, 6, 13, and 14). The sensor comprises one or more optical fibers 10 abutting a core glass 3. Light exiting the optical fiber(s) broadens or expands (as opposed to converging or focusing) in the core glass. (See, e.g., col. 6, lines 4-10 and 62-67, col. 8, lines 13-15, col. 8, line 65 to col. 9, line 2, col. 9, lines 16-18, 41-43, and 65-67, col. 10, lines 15-20; Figs. 2(a), 3, 5, 6, 13, and 14). Thus, Okubo clearly teaches a fiber that expands the exiting light. Okubo further teaches that the "expansion angle can be altered by working the end of the optical fiber, e.g., by melt processing or etching to a hemispherical

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lens or rounded-tip tapered shape." (Col. 8, lines 14-18). Even the Examiner admits that "the fiber itself serves to expand light".

The portion cited by the Examiner for use of a self-focusing lens is simply that an "optical fiber type lens/self-focusing (SELFOC) lens (50)" can be located adjacent the input face (Fig. 13), inside the waveguiding layer (Fig. 14), or close to the output face. (Col. 8, lines 18-23). This is simply teaching that an additional SELFOC lens 50 can be used. This does not teach or suggest that the "melt processing or etching" is on the SELFOC lens 50. In addition, Okubo further teaches that "possible means of broadening the measurement range . . . include . . . interposing a waveguide layer lens (50) between the optical fiber and the input face to enlarge the fiber's expansion angle (FIG. 13)". (Col. 8, lines 25-33) (emphasis added). Thus, the lens 50 acts to further expand the angle, as seen in Figs. 13 and 14.

It is clear that the present invention is used to control and form concave lenses to create desired focal lengths. The specification explicitly states that the "tipped end is further processed in accordance with the present invention to create a focal length controllable integrated lens at the tip" (para. [0008]), the "method of forming the lensed tip optical fiber of the present invention provides for controllable radius or focal length of the lens at the tip at an economical price" (para. [0012]), "FIG. 4C includes simplified illustrations of focal length controllable lens surfaces that can be formed on the modified end of the structure of FIG. 4A in accordance with an embodiment of the present invention" (para. [0019]), the "position of the heating and the amount of energy applied to tipped end 402 determines the physical shape and radius of lens surface 408, and thus the focal length of lens surface 408 formed at tipped end 402" (para. [0037]), and "[f]ocal length and shape controlled lensed tip optical fiber 512 includes lens surface 408, which can be placed close to the output facet of laser 504 to

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efficiently collect most of the light from laser 504 and direct it through optical fiber 512" (para. [0047]).

Accordingly, Applicant contends that it is clear error for the Examiner to conclude that Okubo teaches "applying energy to the modified end of the optical fiber member to form a lens surface with a desired focal length" because Okubo teaches a broadening lens, which necessarily has no focal length.

The Examiner relies on Okubo to teach the same or similar limitation recited in all independent claims 1, 13, and 20. In particular, claim 1 recites "applying energy to the modified end of the optical fiber member to form a lens surface with a desired focal length," claim 13 recites "heating said tip to form a lens surface with a desired focal length," and claim 20 recites "applying energy to the modified end of the optically transparent cylindrical fiber to form the first lens surface with a desired focal length."

Okubo is the only reference the Examiner cites for disclosing applying energy or heating the surface to form a lens with a desired focal length. Because it was clear error to construe Okubo to disclose such a limitation, as discussed above, claims 1, 13, and 20 are patentable over the cited references.

The remaining claims depend on claims 1, 13, and 20.

Therefore, Appellant respectfully requests that the honorary Board of Appeals reverse the Examiner's rejection of claims 1 and 3-22 under 35 U.S.C. §103.

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CONCLUSION

For the foregoing reasons, Appellant respectfully submits that all pending claims (i.e., claims 1 and 3-22) are allowable over Okubo and the other cited references. Accordingly, Appellant respectfully requests the honorary Board of Patent Appeals and Interferences to reverse the Examiner's rejections of claims 1 and 3-22 under 35 U.S.C. §103(a).

If the Examiner or the Board has any questions regarding the above, they are respectfully requested to telephone the undersigned Attorney for Appellant at 949-752-7040.

Certificate of Transmission

Certificate of Transmission: I hereby certify that this correspondence is being transmitted to the United States Patent and Trademark Office (USPTO) via the USPTO's electronic filing system on the date below.

Electronically Filed by:

Annie McNally

Dated: April 25, 2008

Respectfully submitted,

Tom Chen
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CLAIMS APPENDIX

Pending Claims 1 and 3-22 recite:

1. (Previously presented) A method for manufacturing an optical fiber member comprising:

modifying at least one end of an optical fiber member to form an end continuously tapered to the outer circumference of the optical fiber member; and

applying energy to the modified end of the optical fiber member to form a lens surface with a desired focal length, wherein the lens surface continuously tapers outward to the outer circumference of the optical fiber member, wherein said modifying comprises removing material from said at least one end of the optical fiber member.

2. (Canceled)

3. (Original) The method of Claim 1, wherein said modifying comprises etching said at least one end of said optical fiber member by subjecting said at least one end of said optical fiber member to an etching liquid.

4. (Original) The method of Claim 3, wherein said etching liquid comprises HF acid.

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5. (Original) The method of Claim 1, wherein said optical fiber member comprises a material taken from the group consisting of glass, polymer and plastics.

6. (Original) The method of Claim 1, wherein said applying energy to the modified end comprises heating said modified end to form said lens surface.

7. (Original) The method of Claim 6, wherein said lens surface comprises a convex, concave or planer lens surface.

8. (Original) The method of Claim 1, wherein said modifying comprises removing material from both ends of the optical fiber member.

9. (Previously presented) The method of Claim 6, wherein said heating comprises heating both ends to form a lens surface on each end.

10. (Original) The method of Claim 1, wherein said modified end has a first length, and wherein said applying energy comprises applying energy at a location along said length to form said lens surface at a position on the modified end having an angle of between about 15° to about 20°.

11. (Original) The method of Claim 1, wherein said applying energy comprises exposing said modified end to a heat source.

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12. (Original) The method of Claim 1, wherein said applying energy comprises moving said modified end to a spark.

13. (Previously presented) A method for manufacturing a lensed tip optical fiber comprising:

providing an optically transparent cylindrical fiber;

etching a first end of said optically transparent cylindrical fiber to form a tip continuously tapered to an outer surface of the fiber; and

heating said tip to form a lens surface with a desired focal length, wherein the lens surface continuously tapers outward to the outer surface of the fiber.

14. (Original) The method of Claim 13, wherein said optically transparent cylindrical fiber comprises a material taken from the group consisting of glass, polymer and plastics.

15. (Original) The method of Claim 13, wherein said etching comprises etching said optically transparent cylindrical fiber by subjecting said first end of said optically transparent cylindrical fiber to an etching liquid.

16. (Previously presented) The method of Claim 15, wherein said etching liquid comprises HF acid.

17. (Original) The method of Claim 13, wherein said lens surface comprises a convex, concave or planer lens surface.

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18. (Original) The method of Claim 13, wherein said etching comprises etching said first end and a second end of the optically transparent cylindrical fiber.

19. (Original) The method of Claim 18, wherein said heating comprises heating both said first end and said second end to form a lens surface on each end.

20. (Previously presented) An optical fiber comprising:

a first lens surface formed on a first end of an optically transparent cylindrical fiber, said first lens surface formed by:

modifying at least one end of said optically transparent cylindrical fiber to form an end continuously tapered to the outer circumference of the fiber, wherein said modifying comprises removing material from said at least one end of the optical fiber member; and

applying energy to the modified end of the optically transparent cylindrical fiber to form the first lens surface with a desired focal length, wherein the first lens surface continuously tapers outward to the outer circumference of the fiber.

21. (Previously presented) The method of Claim 3, wherein the etching liquid comprises an oil on the top surface of the etching liquid.

22. (Previously presented) The method of Claim 15, wherein the etching liquid comprises an oil on the top surface of the etching liquid.

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EVIDENCE APPENDIX

None.

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RELATED PROCEEDINGS APPENDIX

None.

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